northward of Turks Islands. Warnings and advices followed at frequent intervals thereafter, outlining the development and forecasting the progress of the storm area, until the night of September 6, when the disturbance was moving rapidly northeastward, well out in the Atlantic Ocean.

During the developing stage of the hurricane, as it was moving over remote islands and shoals of the southern Bahamas where there were no ships or island stations to report the passage of the small vortex, the problems of accurately locating the center and its line of advance and of forecasting its probable movement were extremely difficult. Nevertheless, timely and generally accurate advices were issued by the forecast center at Jacksonville, Fla., during this period. Two examples from this series of frequent advisory bulletins will illustrate their character:

Jacksonville, Fla., September 1, 1935.—Advisory 9:30 a. m. Tropical disturbance central a short distance south of Andros Island moving westward about 8 miles per hour attended by shifting gales and probably winds of hurricane force over a small area near the center. Indications that storm will pass through Florida Straits late tonight or Monday. Caution is advised vessels in path. Northeast storm warnings displayed, Fort Pierce to Fort Myers.

Jacksonville, Fla., September 2, 1935.—Advisory 3:30 a. m. Tropical disturbance still of small diameter but considerable intensity is moving slowly westward off the coast of north-central Cuba, attended by shifting gales and probable winds of hurricane force over a small area. It will probably pass through the Florida Straits Monday. Caution is advised against high tides and gales on the Florida Keys and for ships in its path.

The progress of the hurricane northward and northeastward beyond the Florida Straits was fully covered by forecasts and timely warnings issued in turn from the Jacksonville and the Washington forecasting centers, as the storm moved from the one district into the other.

WEST INDIAN HURRICANE, SEPTEMBER 23 TO OCTOBER 2, 1935

By W. F. McDONALD

[Weather Bureau, Washington, October 1935]

While the history of this disturbance is continuous from the afternoon of September 23 until October 2, there is a period of 36 hours, September 26 and 27, during which the characteristics and movement of the storm are obscure and apparently abnormal.

The first positive indication of a disturbance of sufficient vigor to be classed as a definite tropical cyclone was an observation of southwest wind, force 4, with rain and a confused sea, reported by the American S. S. *San Gil*, 7 p. m. of the 23d, when near 14° N., 75° W. A closed isobar of 29.8 inches also appeared on the synoptic chart over the general area northwestward from this position.

A broad but relatively weak cyclonic circulation persisted during the 24th and most of the 25th, and the evidence indicates that a developing center was probably moving westward on these dates, near the fifteenth parallel. At 11 p. m. of the 25th, the American tanker *A. C. Bedford* experienced a minimum barometer of 29.13 inches attended by west-northwest hurricane winds, her position being then very near 15° N., 80° W. This is the lowest barometer reading, and the only ship to report hurricane winds over the Caribbean Sea in connection with this hurricane. (See chart XI for the synoptic situation on the morning of Sept. 26.)

The disturbance appears to have progressed at a very slow rate during the 26th, and to have taken a recurving path toward the western end of Jamaica. Data from ships' reports and island stations are too meager to permit reconstruction of the full history of storm activities during the 27th. It is certain, however, that the center of action shifted rapidly during that day, with the result that there were high winds and excessive rains in Jamaica, causing heavy damage to the banana crop.

There seems little doubt that a minor disturbance, which moved during October 23 to 26 from its origin near St. Lucia toward Jamaica, joined the major cyclone on the 27th and contributed to the excessive rainfall and gale conditions that caused so much damage to the banana crop in Jamaica on the 27th. The progress of this minor disturbance westward was marked by heavy rainfall and local gales, first in Puerto Rico on the 24th, and the next day in southern Santo Domingo.

However, only one cyclonic center passed northward near Cayman Brac on the afternoon of the 27th. This was of hurricane violence, and caused great damage to buildings and crops on the island, although no lives were lost there inasmuch as the inhabitants had taken warning from radio advices and found shelter in available caves.

Early on the 28th, the city of Cienfuegos, Cuba, was seriously affected by passage of the hurricane center, with lowest barometer unofficially reported at 719 mm (28.31 inches). There was heavy property damage in Cienfuegos, Cumanay Agua, and other Cuban localities, as the hurricane crossed the island, and the casualties in Cuba were estimated at 35 deaths and possibly 500 injured. Much damage was due to the floods that attended the passage of the storm.

During the 28th the hurricane moved from the north coast of Cuba into a broad recurve that carried the center over the island of Bimini, where at 12:20 a. m. of the 29th, the wind shifted from southeast to northwest. The last barometer reading to be received from Bimini was 27.90 inches, at 11 p. m., more than an hour in advance of passage of the center which was doubtless marked by considerably lower minimum pressure. Highest wind was estimated at 120 miles per hour.

The tide is reported to have risen 15 feet at Bimini. More than half of the dwellings on the island were damaged and 14 persons killed.

At Miami, Fla., the lowest barometer was 29.35 inches, at 9:45 p. m. of the 28th, and the maximum wind was from northeast, 40 miles per hour. Fowey Rock Lighthouse, 12 miles southeast of Miami, experienced hurricane winds from the north, estimated at maximum to have been about 85 miles per hour, with a barometer reading of 29.24 inches.

Passage of the hurricane northward from the Cuban coast was completely covered in Weather Bureau warnings and advices issued from the forecast center at Jacksonville. At 8 a. m. of the 28th, warnings of "possibly hurricane winds" were issued for the southeast Florida coast, West Palm Beach to Key West. As the recurve became evident during the afternoon, announcement of this development was made at 5 p. m.; and at 7 p. m. the Miami area was notified that winds would not reach hurricane force at that place.

After passing Bimini, the hurricane moved steadily northeastward through the 29th and 30th; on October 1 the center took a course northward across the 60th meridian, and on the 2d merged with another depression over

Newfoundland. Chart XII shows the cyclone on September 30, and its entire track.

The American steamer *La Perla* was near the hurricane center at 1 p. m. of September 29, at 27°14′ N., 76°28′ W., with barometer reading 28.08. Later in the day (9 p. m.) the Japanese steamer *Tokai Maru*, near 28°30′ N., 74° W., met the hurricane with winds veering from east-southeast to west-southwest, and barometer 28.24 inches.

Several ships reported squalls of hurricane force on October 1, as the disturbance crossed the main trans-Atlantic shipping routes, but the cyclone appears to have diminished considerably in intensity after September 29.

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